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Dear Sir:

## Information Disclosure Statement of Method and Apparatus for Safe Handling of Unstable Hydride Gases by Stephen Michael Lord

Pursuant to the guidelines for Information Disclosure Statements set forth in 37 C.F.R. Sections 1.97-1.99 and MPEP Section 609, Applicant(s) submit(s) herewith patents, publications or other information of which he/she/they is/are aware, which is believed to may be material to the examination of this application and in respect of which there may be a duty of disclosure in accordance with 37 CFR 1.56.

A list of patent(s) and/or publication(s) is set forth on the attached Form "Information Disclosure Statement by Applicant." A copy of each item listed is supplied herewith.

Bulletin 627 Bureau of Mines, Flammability Characteristics of Combustible Gases and Vapors by Michael G. Zabetakis. Summary of the available limit of flammability, autoignition and burning rate data for more than 200 combustible gases and vapors and empirical rules and graphs that can be used to predict similar data for different gases and environmental conditions. Provides data on hydrazine, which is an unstable hydride that can explode or burn without an oxidant, and provides information on how hydrazine can be rendered non-flammable by addition of stable gases as diluents or inhibitors. This is an example of the dilution of unstable hydride gases with stable gases.

US Patent # 5,069,291 Method and Apparatus for Suppressing Explosions and Fires and Preventing Reignitions thereof. An apparatus for suppressing fires and explosions which rapidly fractures a diaphragm to release a charge of hot pressurized water into the enclosure when an explosive condition occurs. This is an alternative method of preventing explosions when handling unstable materials which does not require continuous dilution of the potentially explosive material.

Solid State Technology, June 2003, Page 83-88 " Challenges and Solutions for germane (GeH<sub>4</sub>) packaging by Arno J., Griffing S., Sturm E. and Pikulin M. The hazards of handling germane gas, methods of preventing explosions by dilution and sub atmospheric delivery from a sorbent based system. Germane is one of the unstable hydride gases covered by this invention and the methods described in the article are typical of the current solutions to the problem of safe handling of such gases.

United States Patent 5,518,528, Tom, et al. May 21, 1996  
"Storage and delivery system for gaseous hydride, halide, and organometallic group V compounds "

An adsorption-desorption apparatus, for storage and dispensing of hydride gases, halide gases and organometallic Group V compounds This is an alternative way of storing and dispensing hydride gases which uses a solid-phase sorbent inside a vessel.

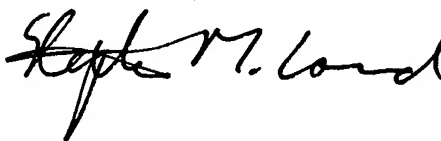
The Journal of Physical Chemistry, Tamaru, K. et al September 20 1955 Page 801-805 "The Thermal Decomposition of Germane. I. Kinetics" Provides information on the temperature for onset of thermal decomposition and on the kinetics of the competing homogeneous and heterogeneous reactions. Also provides information on the effect of the surface on the decomposition rate. Germane is one of the unstable gases covered by this invention and this article describes the kinetic effects neglected in the prior art and illustrates the information needed for proper implementation of the method of this invention.

The Russian Journal of Inorganic Chemistry, Devyatykh G.G. et al April 1966 Page 385-389 "Kinetics of the Thermal Decomposition of MonoGermane" Provides further information on the kinetics of the competing homogeneous and heterogeneous reactions. Also provides information on the effect of the surface on the decomposition rate. Provides in Table 4 information on the activation energy of several of the unstable hydrides covered by this invention and specifically states that "for all the hydrides except monosilane, decomposition involves a heterogeneous reaction to a considerable degree." This information illustrates the failure of the prior art of dilution with gases to appreciate the key differences between monosilane and other unstable hydrides.

The Canadian Journal of Chemical Engineering, Lund, K. et al Volume 77, August 1999, Pages 769-774. This article is an example of the use of finite element analysis to perform a detailed analysis of small-scale thermal conduction in a packed bed. It shows the effect of the thermal conductivity of the gas and of the solid on the overall conduction. It provides an example of one method, which may be used to more accurately determine the spread of heat from an incipient hot spot instead of making the more conservative assumption that the spread of heat is negligible. Such methods can provide refinements to the proposed method of the invention and can be used in various ways to evaluate the materials of construction for the partition, the size of the enclosed volume and the effect of the contact between separate pieces of the partition.

While this Information Disclosure Statement may be "material" pursuant to 37 CFR 1.56, it is not intended to constitute an admission that any patent, publication or other information referred to therein is "prior art" for this invention unless specifically designated as such.

Respectfully submitted,



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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

**Complete if Known**

Application Number

Filing Date

First Named Inventor

Stephen Michael Lord

Art Unit

Examiner Name \_\_\_\_\_

Attorney Docket Number

Sheet	1	of	1
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## U. S. PATENT DOCUMENTS

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## FOREIGN PATENT DOCUMENTS

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Examiner  
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. <sup>1</sup> Applicant's unique citation designation number (optional). <sup>2</sup> See Kinds Codes of USPTO Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Washington, DC 20231.

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